



### Instructions for preparing apparatus

The Supervisor is **not** allowed to consult the Question Paper before the examination. This teacher should, as part of the preparation of the examination requirements, test the apparatus in order to ensure that it is satisfactory.

The Supervisor is asked to give (and attach to the Report form printed on pages 11 and 12) a *brief* description of the apparatus supplied, mentioning any points that are likely to be of importance to the Examiner in marking the answers. The Supervisor should also report any assistance given to candidates. All reports should be signed by the Supervisor and by the person responsible for preparing the apparatus.

In addition to the usual equipment of a physics laboratory, each candidate will require the apparatus specified in these Instructions. If a candidate breaks any of the apparatus, or loses any of the material supplied, the matter should be rectified and a note made in the Report.

### Number of sets of apparatus

As a *minimum*, the number of sets of apparatus provided should be  $N/4$ , where  $N$  is the number of candidates (per session). A few spare sets should, preferably, be available to avoid any candidate being delayed when moving to another question.

Centres may find it more convenient and easier to administer if  $N/3$  sets (plus one or two 'spares') of apparatus are provided.

The order in which a given candidate attempts the four questions is immaterial.

### Assistance to Candidates

The purpose of the Practical Physics test is to find out whether the candidates can carry out simple practical work themselves. The Examiners are aware that candidates may sometimes be unable to show their practical ability through failure to understand some point in the theory of the experiment. If an Examiner were present in the laboratory, he/she would be willing to give a hint to enable such a candidate to get on with an experiment. In order to overcome this difficulty, the Supervisor is asked to co-operate with the Examiners to the extent of being ready to give (or allow the Physics teacher to give) a hint to a candidate who is unable to proceed.

The following regulations must be strictly adhered to.

- (i) No hint may be announced to the candidates as a whole.
- (ii) A candidate who is unable to proceed and requires assistance must come up to the Supervisor and state the difficulty. Candidates should be told that the Examiners will be informed of any assistance given in this way.
- (iii) A report must be made of any assistance given to the candidate, with the name and candidate number of the candidate.

It is suggested that the following announcement be made to the candidates.

'The Examiners do not want you to waste time through inability to get on with an experiment. Any candidate, therefore, who is unable to get on with the experiment after spending five minutes at it may come to me and ask for help. I shall report to the Examiners any help given in this way, and some marks may be lost for the help given. You may ask me for additional apparatus which you think would improve the accuracy of your experiments, and you should say, on your script, how you use any such apparatus supplied.'

### Question 1.

Items to be supplied by the Centre (per set of apparatus unless otherwise specified).

- (i) 3 identical resistance wires, each the same length, approximately 1 m, labelled 'A', 'B' and 'C'. 32 swg (0.274 mm diameter) constantan (Eureka) or any other wire with a resistance of approximately  $8\ \Omega\ \text{m}^{-1}$  is suitable. See note 1.
- (ii) Metre rule or piece of wood approximately 1 m long. See note 1.
- (iii) Power supply of approximately 2V. Where candidates are provided with a variable power supply, the voltage should be set by the Supervisor and fixed, e.g. taped.
- (iv) Switch. The switch may be an integral part of the power supply.
- (v) Three crocodile clips labelled 'A', 'B' and 'C'.
- (vi) Sufficient connecting leads to set up the circuit shown in Fig. 1.1 and two additional leads.
- (vii) Ammeter capable of measuring currents up to 1.00 A with a minimum resolution of 0.05 A .
- (viii) Voltmeter capable of measuring up to 3.0V with a minimum resolution of 0.1 V.

### Notes

1. The wires are to be fixed (taped) to the rule or wood as shown in Fig. 1.1 so that they do not touch except where connected at one end. Candidates must be able to connect the crocodile clips to the free ends of the wires.
2. The circuit is to be set up for candidates as shown in Fig. 1.1. Crocodile clip **A** is to be connected to the free end of wire **A**. The other crocodile clips are not to be connected to the resistance wires.

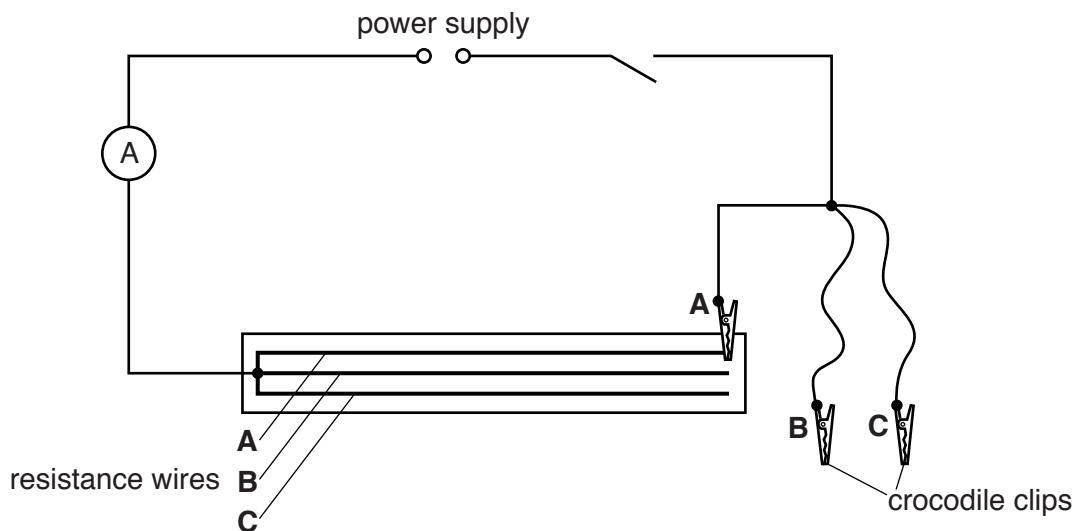


Fig. 1.1

3. If cells are used, they must remain adequately charged throughout the examination. Spare cells must be available.
4. Spare leads should be available.

**Action at changeover**

Reconnect the circuit as shown in Fig. 1.1. Check that it is working. Ensure that the circuit is switched off.

**Question 2.****Items to be supplied by the Centre (per set of apparatus unless otherwise specified).**

- (i) Sheet of plain A4 paper (per candidate) with a hole in one corner so that it can be tied into the Question Booklet.
- (ii) Rectangular, transparent glass or Perspex block, 10 cm × 6 cm × 1.5 cm or similar size.
- (iii) 3 optics pins.
- (iv) Pin board (e.g. cork mat), A4 size or larger.
- (v) 50 cm or 30 cm ruler, graduated in mm. Candidates may use their own.
- (vi) String or treasury tag (per candidate) to tie the ray-trace sheet, (i) above, into the Question Booklet.

**Notes**

1. Spare sheets of plain paper and pins should be available.

**Action at changeover**

Supply a sheet of plain A4 paper, as in (i) above, and string or treasury tag, as in (vi) above.

**Question 3.**

**Items to be supplied by the Centre (per set of apparatus unless otherwise specified).**

- (i) Steel spring. See note 1.
- (ii) Clamp, boss and stand. See note 2.
- (iii) Masses of 100g, 200g, 300g, 400g and 500g, labelled 1.0N, 2.0N, 3.0N, 4.0N and 5.0N. See note 3.
- (iv) Object of mass approximately 340g, labelled **X**. See note 4.
- (v) 50 cm or 30 cm ruler, graduated in mm. Candidates may use their own.

**Notes**

1. An expendable steel spring is suitable, for example a spring with a diameter of 16 mm and a length of 20 mm across the unextended coils (e.g. Philip Harris expendable steel spring B8G87194, [www.philipharris.co.uk](http://www.philipharris.co.uk)). The spring must be able to support a load of at least 5 N without overstretching.
2. The clamp, boss and stand must be set up with the spring suspended from the clamp. The stand must be sufficiently tall to support the spring loaded with the 5.0 N load, with the load just above the bench level.
3. A 100 g mass hanger labelled 1.0 N with 4 × 100 g slotted masses each labelled 1.0 N is ideal. If these are not available, a suitable light hook must be provided so that the masses can be hung from the spring.
4. The object must include a hanger and could be formed from 100 g masses surrounded by modelling clay. It must be made up in such a way that candidates cannot easily detect its value.
5. Spare springs must be available.

**Action at changeover**

Remove the load from the spring if necessary.

Check that the spring has not been deformed by overstretching and replace if necessary.

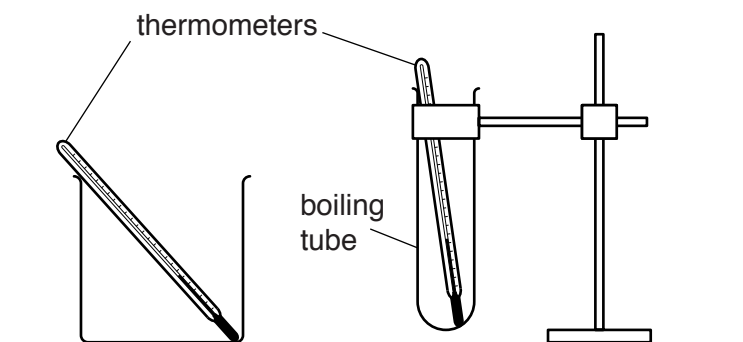
**Question 4.**

**Items to be supplied by the Centre (per set of apparatus unless otherwise specified).**

- (i) 400 cm<sup>3</sup> beaker. See note 1.
- (ii) Boiling tube capable of containing at least 50 cm<sup>3</sup> of water and a thermometer. See note 2.
- (iii) 2 thermometers: –10 °C to 110 °C, graduated in 1 °C intervals.
- (iv) Clamp, boss and stand. See note 2.
- (v) 50 cm<sup>3</sup> or 100 cm<sup>3</sup> measuring cylinder.
- (vi) Stopclock or stopwatch or wall-mounted clock showing seconds. Candidates will be required to take readings at 30-second intervals. They may use their own wristwatches. The question will refer to a stopclock.
- (vii) Supply of cold water. See note 3.
- (viii) Supply of hot water. See note 4.
- (ix) Paper towels to soak up any water spillages.

**Notes**

1. If the beaker does not have graduations, an indelible mark must be made at the 300 cm<sup>3</sup> level and labelled '300 cm<sup>3</sup>'.
2. The apparatus is to be set up for the candidates as shown in Fig. 2.1, without water in the beaker or boiling tube. Candidates must be able easily and safely to move the boiling tube, in the stand, into the beaker so that the bottom of the boiling tube is close to the bottom of the beaker.

**Fig. 4.1**

3. The temperature of the cold water is not important. Water at room temperature is suitable. Each candidate will require approximately  $100\text{cm}^3$  of cold water and will need access to this at times during the experiment.
4. The hot water is to be supplied for each candidate by the Supervisor. The water temperature should be between  $80^\circ\text{C}$  and  $100^\circ\text{C}$ . Each candidate will require approximately  $600\text{cm}^3$  of hot water and will need access to this at times during the experiment. They must be able to pour hot water into the beaker safely and empty it safely.
5. Candidates should be warned of the dangers of burns and scalds when using very hot water.
6. Spare boiling tubes, beakers and thermometers should be available.

**Action at changeover**

Empty the water from the beaker and boiling tube. Check that the apparatus is intact and arrange as shown in Fig. 4.1.





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**This form must be completed and returned with the scripts.**

**REPORT ON PRACTICAL PHYSICS**

(IGCSE OCTOBER/NOVEMBER 2015)

*General*

The Supervisor is required to give details of any difficulties experienced by particular candidates giving their names and candidate numbers. These should include reference to:

- (a) difficulties due to faulty apparatus;
- (b) accidents to apparatus or materials;
- (c) any other information that is likely to assist the Examiner, especially if this cannot be discovered in the scripts;
- (d) any help given to a candidate.

*Information required*

A plan of workbenches, giving details by candidate number of the places occupied by the candidates for each experiment for each session, must be enclosed with the scripts.



*Information required (cont.)*

A list by name and candidate number of candidates requiring help, with details of the help provided.

CENTRE NO. ....

NAME OF CENTRE .....

*Declaration (to be signed by the Supervisor and the person responsible for preparing the apparatus)*

The preparation of the practical examination has been carried out so as to maintain fully the security of the examination.

SIGNED .....  
Supervisor

SIGNED .....  
Person responsible for preparing the apparatus

